

# Life-cycle assessments in the South African water sector: A review and future challenges

**Chris Buckley<sup>1</sup>, Elena Friedrich<sup>2\*</sup> and Harro von Blottnitz<sup>3</sup>**

*<sup>1</sup>Pollution Research Group, School of Chemical Engineering, University of KwaZulu-Natal, Durban 4041, South Africa*

*<sup>2</sup>Centre for Research in Environmental, Coastal and Hydrological Engineering (CRECHE), School of Civil Engineering, Surveying and Construction, University of KwaZulu-Natal, Durban 4041, South Africa*

*<sup>3</sup>Environmental and Process Systems Engineering Research Group, Department of Chemical Engineering, University of Cape Town, Rondebosch, 7701, South Africa*

## **Abstract**

This paper reviews South African water sector life-cycle assessments (LCAs) and develops a position on how this tool could be strategically employed in the future. It summarises the studies undertaken, highlighting the significant findings and the lessons learnt. In addition, international trends and their implications for the local LCA community and the water sector are presented and strategic recommendations for the future are included. The various LCA studies undertaken in the local water industry have shown that the abstraction of water from the environment (in a country where it is a limited resource) and the use of energy for treating and pumping water and wastewater have the highest environmental burdens. These studies have also demonstrated the versatility of LCA as a decision-making tool in the water industry by comparing technologies and scenarios, identifying improvement opportunities and prioritising interventions and their consequences in complex water systems. Recent international work has confirmed the usefulness of a life-cycle approach also for water footprinting. Therefore, in South Africa it is important to promote the use of LCAs for the water sector in order to improve efficiency of processes and systems, but also to promote life-cycle based water footprinting and to include differentiated water consumption data into life-cycle inventories to make more efficient use of water as a resource.

**Keywords:** life cycle assessments, water footprinting, urban water systems